

# ***DONNA J. BROGAN LECTURE IN BIostatISTICS***



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## **" Precision Discovery of Neuroimaging Biomarkers for Parkinson's Disease"**

Abstract:

Parkinson's disease (PD) is a complex neurodegenerative disorder that manifests through hallmark motor symptoms, often accompanied by a range of non-motor symptoms. There is a putative delay between the onset of the neurodegenerative process, marked by the death of dopamine-producing cells, and the onset of motor symptoms, creating an urgent need to develop biomarkers that may yield early PD detection. Neuroimaging offers a non-invasive approach to examine the utility of a vast number of functional and structural brain characteristics as biomarkers. We present a statistical framework for analyzing neuroimaging data from multiple modalities to determine features that reliably distinguish PD patients from healthy control subjects. This pursuit involves precision discovery from ultra-high dimensional data. Our approach builds on the statistical learning procedure elastic net, performing regularization and variable selection, while introducing additional criteria centering on parsimony and reproducibility. We apply our methods to data from two studies of PD. We demonstrate high accuracy, assessed via cross-validation, and identify brain regions in the basal ganglia and outer cortex that are implicated in the neurodegenerative PD process.

**Monday, April 15, 2019  
4:00 PM**

**Lawrence P. & Ann Estes Klamon Room, 8030  
Rollins School of Public Health  
Claudia Nance Rollins Building, 8<sup>th</sup> Floor  
1518 Clifton Road, N.E.**

**(Reception immediately following the lecture)**